COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of

Electronic Application of Bluegrass Water Utility Operating Company, LLC for Certificates of Convenience and Necessity for Projects at the Herrington Haven Site	))))	Case No. 2022-00102

Bluegrass Water's Response to Staff' Second Request for Information

The Applicant, Bluegrass Water Utility Operating Company, LLC ("Bluegrass") herewith submits its Response to the Commission Staff's Second Request for Information. A signed, notarized verification for this Response appears on the following page. The undersigned counsel is responsible for any objection noted for a particular response.

Documents referenced in response to a particular Staff data request (2 PSC __) have been stamped with identifying numbers beginning with "KY2022-00102_BW_" and are attached in sequence at the end of the Response.

ID #s, from-to	Title / Description	In response to
0447	UV Disinfection Costs	2 PSC 05
0448	Operations Costs	2 PSC 06

Respectfully submitted,

/s/ Kathryn A. Eckert

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Bluegrass Water Utility Operating Company, LLC

Verification

I, **Aaron Silas**, Regulatory Case Manager of Central States Water Resources, Inc., the manager of Applicant Bluegrass Operating Company, LLC being duly sworn, state that I prepared or supervised the preparation of the following responses to PSC's Second Request for Information, and that the matters and things set forth in the responses are true and correct to the best of my knowledge, information and belief formed after reasonable inquiry.

Aaron Silas

STATE OF MISSOURI)
COUNTY OF St. Louis)

Subscribed, sworn to, and acknowledged this 10th day of June, 2022, before me, a Notary Public in and before said County and State.

My Commission expires: 11.13.2022

NOTARY PUBLIC

{seal}

NOTARY PUBLIC NOTARY SEAL STATE OF MISSOURI

MERANDA K. KEUBLER
My Commission Expires
November 13, 2022
St. Louis County
Commission #14631487

Request

1. Refer to Bluegrass Water's response to Commission Staff's First Request for Information (Staff's First Request), Item 1 and Attachment KY2022-00102_BW_0001- 355.
   a. State whether the technical specifications include projects other than the moving bed biofilm reactor (MBBR), peracetic acid disinfection, and digester projects proposed in this matter.
   b. If so, identify those portions of the technical specifications that describe the other projects.

Response

a. No. The technical specifications are only for the moving bed biofilm reactor (MBBR), peracetic acid disinfection, and digester projects proposed in this matter.

b. Not applicable.

Request

2. Refer to Bluegrass Water's Response to Staff's First Request, Items 6 and 7.
    a. Explain what the IFAS cage is, how it functions in relation to the other components of the MBBR system, and its purpose within the MBBR system.
    b. Explain the differences in the design, function, and effectiveness of constructing an MBBR system in existing tankage as proposed and an "upstream" MBBR system.
    c. Assuming a manhole could be constructed, confirm that the capital costs and annual operations and maintenance expenses of the proposed MBBR system and an "upstream" MBBR system would be the same, and if not, explain the differences in the expected costs and expenses.
    d. Provide the expected useful life of an "upstream" MBBR system, and explain any differences between the useful life of that system and the proposed MBBR system, if any.
    e. Regarding the statement that "the current property owner would only allow for the installation of a single manhole," provide the reason for this condition and identify the property to which you are referring.

Response

a. The IFAS (Integrated Fixed-film Activated Sludge) cage is the physical cage structure which will contain the MBBR media inside of the tank. Thus, the IFAS cage prevents the MBBR media from flowing freely through the plant. Specifically, an MBBR is a type of IFAS system where the growing media for the fixed film is small, free floating, wagon-wheel shaped pieces of plastic media which are contained in an area with aeration for the activated sludge process. A biofilm (the fixed film) forms on the media. The basic concept of any IFAS system is to provide excessive surface area for film formation to dramatically increase the variety and amount of biological activity in the system. Traditional/conventional IFAS systems achieve this with a rigid structure for media not unlike coalescing media in an oil water separator. MBBRs instead utilize the mobile

media described above which offers advantages over a traditional IFAS system. MBBR media's movement causes collisions of the mobile media to mechanically break down solids, allowing better biological processing, and cause the biofilm to shed from the media, allowing even more to form resulting in even denser biological activity than conventional IFAS. The MBBR systems are also more affordable than the fixed media structures, and easier to maintain as the media can be pumped out of the system rather than requiring dewatering the system (likely including service interruptions) and using heavy equipment to pull the media pack.

b. The sole difference between these options is whether the system is installed in a separate manhole structure used as a tank upstream of the current infrastructure, or in a cage in the existing aeration tank. The function and effectiveness are the same, though installing the MBBR upstream would also require an additional blower as it would run separately from the existing aeration basin. The effectiveness would not be any different between the two systems as both would allow for compliance with ammonia limits.

c. As an initial matter, it is unclear whether a manhole can be constructed. As can be seen in the layout of the previously provided plan sheets, the landowner has only allowed Bluegrass to expand the fenced in area to a limited space, providing only enough room for the new aeration equipment and one manhole. This means that either the upstream MBBR or the proposed digester can be built, but not both. Should the Commission reject the proposed digester project, Bluegrass would still recommend building the MBBR in an IFAS cage inside the existing basin instead of in an upstream tank. This recommendation will reduce the capital expense of the project because it would not require the installation

of a new manhole and would allow the system to be run from the same blowers as the rest of the aeration basin, instead of requiring additional blowers. While the operating expense of the two systems is nearly identical (except for the upstream tank/system having slightly higher electrical costs due to the necessity of an additional blower), the capital cost of the upstream tank / system would be significantly higher. The cost of a new tank / system and the piping modifications to install it would be more than double the cost of the IFAS cage, while all other costs will essentially remain the same. Therefore, the upstream option was rejected. Conversely, the piping modifications needed for the digestor in a separate tank are significantly less than the upstream MBBR as this will only require a WAS (waste activated sludge) line from the clarifier rather than having to route flow into and out of the manhole. The lesser amount of piping contributes to the lower capital cost of the digester in a separate tank as compared to the upstream MBBR.

d. The expected useful life of an "upstream" MBBR system is 20 years. Additionally, there are no differences between the useful life of that system and the proposed MBBR system.

e. The area outside the fencing of the plant belongs to an individual who has stated they will allow Bluegrass to install a single manhole; however, this individual has made clear that no more than one may be installed on their property outside of the fence. The individual did not divulge their own reasons for not wanting more significant changes to their property. The property involved is shown on the maps provided in Application Exhs. D and E.

Request

3. Refer to Bluegrass Water's Response to Staff's First Request, Item 7. Provide any documentation, including but not limited to reports, spreadsheets, or correspondence used to evaluate the cost or feasibility of connecting the sewer system to Lancaster or Danville.

Response

Please see the response to 1 PSC 07. No additional documentation responsive to this request exists. Following the initial exploration of the possibility to connect to Danville, Bluegrass determined that a connection to Danville would require over 8 miles of sewer main and require crossing the Dix River at an established utility corridor. The costs associated with making this connection are prohibitively high and it was clear that this option would not be feasible. No additional investigation was undertaken beyond the simple calculation for high level cost estimate that was already provided in the response to 1 PSC 07. Similarly, initial exploration of the option of connecting to the Lancaster system showed that over 10 miles of main would be required to connect to the system. As shown in preliminary cost estimated provided in response to 1 PSC 07, this was also found prohibitively expensive, and no further investigation was undertaken. Additionally, due to the distance, neither of these systems would be considered "available" as that term is used in 401 KAR 5:002. For these reasons, no additional documentation was prepared relating to the possibility of connecting to either of these municipal systems.

Request

4. Refer Bluegrass Water's Response to Staff's First Request, Item 11.
    a. Explain the basis for the statement that peracetic acid disinfection and a new chlorine system would have roughly the same cost, including whether the capital cost would be comparable, whether the annual operations and maintenance expense would be comparable, and how you assessed the comparative cost of each project. Include the estimated cost of the new chlorine system if available, and if not available, explain how you determined the costs would be comparable.
    b. Provide the expected useful life of a new chlorine system, and explain any differences between the useful life of that system and the proposed peracetic acid disinfection system.

Response

a. The costs would be similar because both systems essentially consist of the same equipment. They would both: (1) make use of a modification of the existing contact chamber, (2) include the installation of post-aeration in that contact chamber, and (3) utilize an essentially identical chemical feed system. The chemical cost component of peracetic acid and chlorine disinfection (the primary operational cost) would also be essentially the same. The only significant difference is that the chlorine disinfection system would require, in addition to the chemical cost of chlorine and the chemical feed system for the chlorine, a second chemical feed system (an inexpensive tablet dechlorinator) and additional chemical expense associated with dechlorination. While these cost differences are small, it would mean that the Chlorine disinfection system would cost slightly more to build and operate than the proposed peracetic acid disinfection system.

b. The expected useful life for both the chlorine disinfection system and the peracetic acid system would be 20 years for the chemical dosing equipment and 30 years for the

electrical distribution (for the post aeration component). Therefore, the expected useful life of these two systems is the same.

Request

5. Refer to Bluegrass Water's Response to Staff's First Request, Item 15.
    a. Provide the projected cost of constructing an ultraviolet disinfection.
    b. Provide any documentation, including, but not limited to, reports, spreadsheets or correspondence used to evaluate the cost or feasibility of the ultraviolet disinfection system.

Response

a. Please see attachment labeled as KY2022-00102_BW_0447.

b. Please see the attachment provided in subpart (a). 21 Design Group provided the estimated cost to Bluegrass as they are a third-party engineering group with extensive experience in similar projects and therefore have the knowledge to provide realistic cost estimates and recommendations based on actual expected project cost.

Request

6. Refer to Bluegrass Water's Response to Staff's First Request, Item 20.
    a. State whether the $40,000 cost for the polymer feed is the total capital cost necessary to implement that process. If so, explain how that estimate was determine. If not, provide the estimated capital cost to implement that process, and explain how that estimate was determined.
    b. Describe any modifications would need to be made to the plant to institute the polymer feed process.
    c. Provide the estimated useful lives of any capital projects necessary to institute the polymer feed process.
    d. Provide an estimate of the expected increase in annual expense for sludge hauling and chemicals associated with the polymer feed process as compared to the digester, and explain how that estimated increase was projected.
    e. Explain any other expected differences in the annual operations and maintenance expenses between the polymer feed process and the digester.
    f. State whether the increased sledge hauling frequency would address the reduction in capacity cited as an issue with the polymer process such that the plant could continue to operate within permit limits, and if not, explain the basis for the response.

Response

a. The cost provided is a high-level estimate of the total cost of the polymer system. This was determined based on similar projects completed by Bluegrass's parent company on similar plants.

b. The modifications would consist of adding chemical storage tanks, pumps for the polymer chemicals and adding a chemical feed into the aeration basin. It is questionable if this equipment could fit into the area available with the blowers and tank required for the other improvements.

c. The expected useful life of this type of system would be 20 years.

d. The extremely small size of the treatment plant maximizes the negative effect on capacity related to this type of treatment system. It is also important to recognize that there is a minimum cost for a contract sludge hauler to come to a site, even if less than a full load of sludge is hauled. As the plant is only 10,000 gpd, operational costs for the aerobic digester are relatively low due to the small size of the blower. Additionally, the ability to thicken and dewater sludge in a digester can reduce the amount of sludge that needs to be hauled by approximately 75% in this application. While the addition of a polymer or coagulant would help with settling issues, the volume of the sludge produced may still be significantly higher, and would therefore increase sludge handling costs. This would result in a required sludge hauling frequency of four times the frequency of the proposed system with a digester and no polymer feed, and likely even higher frequency with the addition of a polymer feed. Conservatively, a polymer feed would increase the required frequency compared to the plant as it is today by 50% while the installation of a digester would reduce the frequency by 75%. Please see the attachment labeled KY2022-00102_BW_0448. for a breakdown of the projected impact on operations cost. While the digester would have a projected annual operations cost of $1,837.16 (broken down at $131 for electrical cost and $1,706.16 for sludge hauling with no chemical costs), the polymer feed system would have a projected annual operations cost of $10,736.35 ($72 for electrical cost, $6,438.35 for sludge hauling, and $4,226 for chemical costs).

e. These costs differences were discussed in the response to subpart (d)above and the attachment thereto. The digester has a higher electrical cost and over time results in much lower solids hauling costs. This is because the digester allows for additional breakdown

of solids to reduce total sludge volume, the digester provides storage space for sludge to reduce the frequency of sludge hauling trips (thereby avoiding payment for partial loads of sludge), and digester also allows water to be decanted from solids prior to hauling (ensuring payment is for hauling solids instead of water). The installation of a digester also gives operators the ability to waste sludge at a rate which will allow maintenance of a healthy biomass concentration within the necessary range. Typically, when solids are directly removed from a plant this small, more sludge is removed than necessary. This then causes issues with the health of the biology inside of the plant. If the MLSS (Mixed Liquor Suspended Solids) concentration dips below the healthy range, the bacteria become dispersed, and the number of microorganisms that consume organic material would be too low relative to the influent organic loading. This causes settling issues in the secondary clarifier and increasing BOD, NH3-N, and TSS concentrations in the effluent. While the addition of a polymer would help with these settling issues, it would not fix the root problem.

Aerobic Digesters can (1) break down the organic portion of the waste activated sludge, (2) reduce sludge volume, and (3) treat sludge for subsequent reuse such as land application. When the sludge is allowed to settle, a layer of water forms at the surface. This is known as supernatant, which in this case is decanted using pipes at varying elevations that can be opened via ball valves. The decanted water is conveyed back into the aeration basin. The ability to decant and thicken the sludge in a digester is crucial in terms of sludge handling costs, as it greatly reduces the amount of sludge that needs to be hauled.

f. Yes, additional sludge hauling would address the issue of capacity reduction due to additional sludge accumulation; however this makes for much higher operational costs to achieve compliance.

Request

7. Refer to Bluegrass Water's October 21, 2021 Corrective Action Plan (CAP) contained in Bluegrass Water's Response to Staff's First Request at KY2022- 00102_BW_0389-0390.
    a. State whether the Energy and Environment Cabinet (EEC) has approved Bluegrass Water's October 21, 2021 CAP.
    b. Explain what that "relocation of the effluent V-notch weir and post- aeration basin onto the Owner's property" is referring to, when that project is expected to be started and completed, the estimated cost of the project, and whether that project will impact or is part of any of the projects proposed herein.

Response

a. Yes, the corrective action plan was approved.

b. Originally, it was assumed that this contact chamber would need to be relocated as it was not on the defined easement for the plant equipment and was in an area where flooding was possible. After operating the system, the wall height was slightly increased which has eliminated the flooding issue and it was determined that the chamber would not need to be moved. This was discussed with the EEC in a phone call and will be reflected in the final reporting on the Corrective Action Plan. There is as a result no cost associated with moving the chamber as this will no longer take place.

Request

8. Refer to Exhibit A to bluegrass Water's Agreed Order with the EEC beginning in Bluegrass Water's First Response to Staff's First Request on KY2022-00102_BW_0403 and to the Direct Testimony of Jacob Freeman in Case No. 2020-00290,[1] pages 48-51.
    a. Provide a more legible copy of that report beginning on KY2022-00102_BW_0403.
    b. Explain the basis for the change in 21 Design's recommendation between the report beginning on KY2022-00102_BW_0403 and the report beginning KY2022-00102_BW_0367 regarding the placement of the MBBR system in the existing tank and the placement of the MBBR system upstream.
    c. State whether the report beginning on KY2022-00102_BW_0403 recommended a solids processing system. If not, explain what changed that made Bluegrass Water determine that a solids processing system would be necessary and why the report indicates that solids could be reduced without the system. If so, explain where it is mentioned.
    d. State whether the projects included in Mr. Freeman's testimony in Case No. 2020-00290 included the solids processing system. If not, explain what changed that made Bluegrass Water determine that a solids processing system would be necessary. If so, explain where it is mentioned in Mr. Freeman's testimony in Case No. 2020-00290.
    e. Explain whether the placement of the MBBR system in the existing tank as opposed to upstream has any effect on sludge accumulation.

Response

a. Please see Bluegrass's response to 1 PSC 022. The full resolution memorandum was previously provided within that response reference on pages KY2022-00102_BW_0377 - 0381.

b. Please see the response to 1 PSC 02. As discussions about design continued, it became clear that the area in question available for plant improvements only provided enough

[1] Case No. 2020-00290, *Electronic Application of Bluegrass Water Utility Operating Company, LLC for an Adjustment of Rates and Approval of Construction*, Application, Exhibit 8 (tendered October 1, 2020).

space for one manhole to be used as additional tankage, and that this space must be used for the digester. In exploring alternatives (besides the upstream MBBR) to still implement the attached growth treatment necessary to achieve permit limit compliance permit limits, the proposal for an MBBR media cage was developed. This MBBR cage alternative was determined to be a less expensive option than a manhole MBBR, regardless whether there had been room for a second manhole.

c. The initial report did not include the addition of enhanced solids handling, as it was prepared during the acquisition process of the system and before Bluegrass had an opportunity to operate the facility. At the time, the third-party engineer (21 Design Group) believed that improved operations may resolve issues with suspended solids exceedances. After acquiring and operating the facility, it became clear that the system as it was configured was incapable of meeting permit limits. Thus, the solids processing system was deemed necessary.

d. As in subpart (c) above, the testimony relating to this group of acquisitions (Herrington Haven, Woodland Acres, Springcrest, and Delaplain Disposal) from the rate case was filed prior to the acquisition was approved by the Commission and prior to any operation of the systems therein. This testimony was prepared with the information from the original engineering report (referenced in subpart c) and therefore did not include the solids handling enhancements. After acquiring the Herrington Haven system, it became evident that solids handling enhancements were needed to ensure compliance with Total Suspended Solids limits.

e. The positioning of the MBBR system in the existing tank -- as opposed to a proposed upstream manhole -- will not affect sludge accumulation.

Request

9. Refer to the correspondence provided in Bluegrass Water's Response to Staff's First Request, at KY2022-00102_BW_0410-04.
   a. State whether the CAP provided in response to Staff's First Request is the corrected CAP referred to in the correspondence, and if not, provide the corrected CAP.
   b. Identify any actions in the CAP, if any, that the EEC indicated may not be necessary, explain why they indicated it may not be necessary, and explain how that issue was resolved with the EEC.

Response

a. Yes, this is the updated and corrected CAP. The only update included was a minor grammatical change after reviewing the facility's performance and determining that the improvements submitted were required. The EEC accepted this CAP indicating agreement with the assessment.

b. No specific items were ever highlighted by the EEC as unnecessary. The correspondence included in the previous response was the only mention of necessity and no additional details were provided. The EEC then accepted the entirety of the CAP as provided in the previous response in the first set of Commission Staff's data requests. The inspection staff referred to in the emails cited in this Request are not typically involved in evaluating a facility's capability of treating to permitted limits. Instead, the inspection staff focus on the condition of the existing assets and the site. The permit review staff are responsible for reviewing and evaluating the construction permit application. Furthermore, the facility's failure to consistently comply with permitted limits, even following post-acquisition improvements in operational practices, dictated which improvements would be required and approved by the EEC.

Request

10. State whether any of the proposed construction will result in service interruptions, and, if so, provide the expected duration of the interruptions.

Response

No service interruption is anticipated to be caused by the construction activities.

Request

11. State whether the current extended aeration process and clarifier could be optimized to improve treatment in lieu of adding an MBBS system using an IFAS cage and explain each basis for your response.

Response

Bluegrass maintains that the proposed improvements, which include an MBBR (mistakenly referenced in this Request as an MBBS), are each necessary to meet limits. Since Bluegrass's acquisition, optimizations to improve treatment have occurred merely by improving operational practices and cleaning up the facility. Nevertheless, the facility continues to violate limits because of the limitations discussed previously in the Application and subsequent responses to data requests. Bluegrass always has the goal to maximize the operational efficiency of existing assets instead of making capital improvements. This strategy also has the effect of minimizing customer rate impacts. Bluegrass's willingness to forego capital improvements in lieu of operational efficiency has been evidenced by other extended aeration facilities owned by Bluegrass (Kingswood, Lake Columbia, Longview-Holmstead, etc.). Process improvements are only proposed at facilities which have demonstrated continued inability to achieve compliance with permit limits despite operational improvements.

Request

12. Provide the current status of Bluegrass Water's request for permits from the EEC for the projects proposed herein.

Response

The construction permit application is currently under review by the DOW/EEC. The permit is expected to be approved shortly.

Request

13. Identify all projects that Bluegrass Water has completed at the Herrington Haven system and the date each such project was placed in service, briefly describe the purpose of each such project, and provided the estimated and final cost of each such project.

Response

No major rehabilitation or upgrade project has begun at the Herrington Haven facility as Bluegrass has been seeking approval of both this CPCN application and the EEC / DOW construction permit prior to initiating any improvements that constitute a process change. Rather, operational adjustments (such has sludge hauling) have been utilized. Additionally, gravel has been placed around and inside the fenced area so that operations vehicles can access the site. Two sections of grating over the plant (which had been set to the side by previous ownership after they became too rusted to safely walk on) were replaced, and handrails were installed around the unprotected leading edge of the aeration basin. Again, these are regarded as required safety measures and usual course of business activities rather than "projects." The gravel driveway project was placed into service on May 31, 2021 at a cost of $2,000. The structural grating and handrails project was placed into service on May 31, 2021 at a cost of $4,000.

Request

14. Explain what a Grade A Reliability classification is and its effect, if any, with respect to the operation of the system.

Response

These reliability grade classifications are discussed in Section 13 of the Kentucky Administrative Regulations Title 401 Chapter 5 Regulation 5 document ("Permits to construct, modify, or operate a facility)." In the construction permit application, it is necessary to provide a reliability grade for the treatment plant in question, as certain receiving streams require certain reliability grades based on water quality use designations. There are three reliability grades: A, B, and C, with A being the most reliable. The addition of a manual transfer switch gives operators the ability to use a portable generator, which then allows the plant to function during outages. Additionally, if treatment components break, there are redundant units that Bluegrass can use while repair is needed. Based on the ability to continuously use the biological treatment and disinfection processes, the plant would be considered Grade A in terms of reliability and require the manual transfer switch.

Life Cycle Cost Analysis Summary
Herrington Haven

	UV		PAA	
	Annual Cost	20 Yr. PW	Annual Cost	20 Yr. PW
Capital Costs		$60,000		$22,250
O&M Costs				
Annual Chemical Consumption Costs	$0		$1,165	
Annual Replacement Costs	$2,300		$500	
Annual Electricity Costs	$855		$653	
Total Annual O&M Cost	$3,155	$42,877	$2,319	$31,515
Total Present Worth		$102,877		$53,765

Peracetic Acid Disinfection System	
PAA Equipment and Pad	$17,250
Electrical Distribution for PAA	$5,000
	$22,250
UV Disinfection System	
UV Equipment and Pad	$25,000
Electrical Distribution for UV	$5,000
Piping Modifications	$5,000
Pump Station Installation	$25,000
	$60,000

Item	Quantity	Motor Size Each (HP)	Motor Size Total (HP)	Run Time (hrs/day)	Energy Consumption (kwh)	Annual Power Costs ($)
Aerobic Digester						
Duty Blowers - Normal	1	**0.20**	0.20	**24.00**	**0.15**	$131
					0.00	
TOTALS						$131
Polymer Feed						
Peristaltic Dosing Pump	1	0.11	0.11	**24.00**	**0.08**	$72
					0.00	
TOTALS						$72

Sludge Hauling Cost (Digester without Polymer)		
WAS Sludge Production Rate	0.4	lbs WAS/lb. BODr
WAS Sludge Production	7.4	lbs. WAS/day
Volatile Solids Concentration	75%	
% Volatile Solids Destroyed	45%	
Digested Sludge Production	4.9	lbs. DS/day
Digested Sludge Concentration	15,000	mg/L
Digested Sludge Production Daily	39.0	gpd
Digested Sludge Generated Annually	14,218	gal
Sludge Hauling Costs ($/gallon):	$0.12	
Annual Sludge Hauling Costs:	$1,706.16	

Total Annual Cost $1,837

Sludge Hauling Cost (Polymer without Digester)		
Sludge Production Rate	0.4	lbs./lb. BODr
Sludge Production	7.4	lbs./day
Sludge Concentration	6,000	mg/L
Sludge Production Daily	147.0	gpd
Sludge Generated Annually	53,653	gal
Sludge Hauling Costs ($/gallon):	$0.12	
Annual Sludge Hauling Costs:	$6,438.35	

Coagulant Chemical Cost		
Average Dosage	50	mg/L
Density	11.14	lb/gal
Percent Solution	49%	
Average Pumping Rate	0.75	gpd
55 Gallon Drum Storage (Average Cond.)	73.4	days
Coagulant Chemical Cost ($/55 gal.)	$850	
Coagulant Chemical Annual Cost	$4,226	

Total Annual Cost $10,736